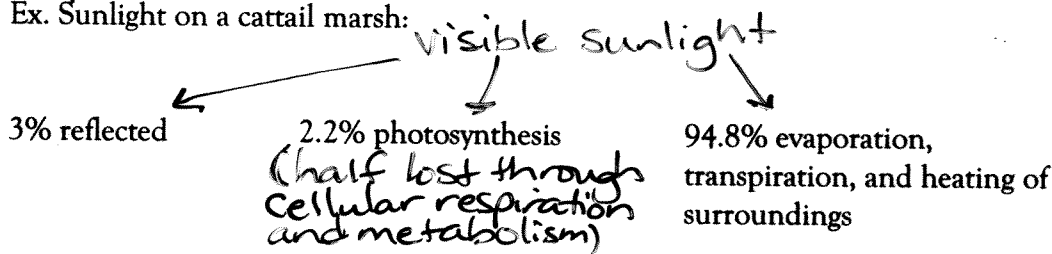


Ecosystem Productivity

Gross productivity - Amount of energy trapped in organic matter during a specified interval at a given trophic level

Ex. Sunlight on a cattail marsh:



Net productivity - gross productivity minus that lost by respiration of the organisms at that level.

Estimated Net Productivity of Certain Ecosystems (in kilocalories/m ² /year)	
Temperate deciduous forest	5,000
Tropical rain forest	15,000
Tall-grass prairie	2,000
Desert	500
Coastal marsh	12,000
Ocean close to shore	2,500
Open ocean	800
Clear (oligotrophic) lake	800
Lake in advanced state of eutrophication	2,400
Silver Springs, Florida	8,800
Field of alfalfa (lucerne)	15,000
Corn (maize) field, U.S.	4,500
Rice paddies, Japan	5,500
Lawn, Washington, D.C.	6,800
Sugar cane, Hawaii	25,000

What causes the differences in the numbers above?

What causes these numbers?

- variations in temp. (optimal 15° to 25°C)
- fertility (soil nutrients)
- availability of H₂O
- latitude →
- solar radiation
- CO₂

Least productive ecosystems - limited by heat and water (deserts, polar tundra)

most productive ecosystems - high temps, plenty of water, lots of soil N₂.

How do we change the productivity in any of these areas?

paving with asphalt, burning forests
for agriculture

What happens to the productivity of a plant community?

1. Harvested by herbivores then moves through food chain (producer → herbivore → 1° carnivore → 2° carnivore)
2. decay of organisms (consumed by fungi & bacteria)
3. stored in biotic organisms in forests or bogs
4. used by humans directly (corn, wheat) or indirectly (animals or animal products)
5. wood for fuel and fiber Exs. cotton, flax, wood for building

We use 1/3 of the world's net productivity for our own use.

Gross primary productivity - Total ^{that} plants have created fixed through photosynthesis (Total worldwide - 243 billion metric tons)

net primary productivity - after plant respiration what is left.

Gross Secondary productivity - what is assimilated by the consumer.

* Assimilation is an inefficient process - is powered by respiration (~~releasing~~ energy from food) - energy used for maintaining the organism, reproduction, finding / capturing food.

* 4 routes assimilated material can take:

- ① respiration
- ② biomass accumulation
- ③ Consumption by consumers
- ④ decay of organic matter.

Net - amount consumed - waste released.

Finite trophic levels (4 or 5) - no longer able to consume enough to balance energy lost.